

## 3.4.OMEGA NAVIGATION SYSTEM TEST TECHNIQUES

### 3.4.1.Initialization

#### 3.4.1.1.Purpose

The purpose of this test is to determine the amount of time that the OMEGA requires from the time it is turned on until it begins providing a position (initialized) and to assess the effects that this time has upon the launch preparation time.

#### 3.4.1.2.General

After the OMEGA is turned on and the initial position provided by the operator, the OMEGA computer then searches for the signals from the OMEGA ground stations. In modern, airborne OMEGAs, the ground stations used at the initial position are selected from an internal table and are based upon the geometry to the stations. The stations are selected to limit the effects of GDOP by choosing pairs that provide hyperbolic lines that cross at as close to 90° as possible. In addition, the effects of the differences in day and night propagation, the day/night transition line, near station modal interference and PCA are usually considered in station selection. Following station selection, the OMEGA must analyze the phase relationship of the signals and integrate to a solution. The initial fix can take from 1 to 5 minutes depending upon the characteristics of the OMEGA being tested and the propagation characteristics of the day.

In addition to selection of stations, the initial fix is used to determine the initial lane location. The lanes are ambiguous every 8 nm in the worst case, and station selection changes over even longer distances, and so taxi distances before takeoff have little or no effect upon the OMEGA initialization. For this reason, the factor limiting the allowable integration time is the time from OMEGA turn on to takeoff, where the first OMEGA position display is required. The time to turn on the OMEGA, input the initial position, and for the OMEGA to select the ground stations and to integrate to a solution should be less than the alert launch requirement of the aircraft. This test should be repeated over as many days as possible to allow for a wide variance of

propagation characteristics. Since the entire procedure can be quite time consuming, some status indication is required to indicate to the operator that the process is proceeding normally and as an indicator of the approximate time left to completion. Finally, the operator must be alerted to the fact that the OMEGA has integrated to an initial solution and is ready for flight. Generally an operator alert is provided.

#### 3.4.1.3.Data Required

Record the time from when the initial position is input to the OMEGA to the time that the initialization complete alert is provided. Record qualitative comments concerning the utility of the initialization complete alert as an indicator that the OMEGA is ready for flight. Record qualitative comments concerning the effects that the time required for initialization of the OMEGA will have upon mission relatable quick reaction alert launches. Record as notes a description of the weather conditions.

#### 3.4.1.4. Instrumentation

A stop watch and data cards are required for this test. A voice tape recorder is optional.

#### 3.4.1.5. Procedure

Perform a preflight/BIT, starting the stop watch immediately after entering the initial latitude and longitude. Allow the OMEGA to automatically select the internally derived ground stations. Monitor the status indications as the OMEGA integrates to an initial fix. Note the elapsed time when an alert is posted, indicating that the OMEGA has integrated to an initial fix and that the system is ready for flight.

#### 3.4.1.6. Data Analysis and Presentation

Add the time required to turn on and input the initial latitude and longitude to the time required for the OMEGA to integrate to an initial position and post an alert. Relate the time required to the time available to make an alert launch and the possibility of launching without OMEGA derived position information. Relate the clarity and accuracy of the initialization status indications to the possibility of prematurely initiating troubleshooting procedures while waiting for an initialization complete alert. Relate

the clarity and location of the initialization complete indication to the possibility of missing the alert and delaying the launch.

Severe weather may interfere with the ground station signals and may thus prolong the initialization process. If the initialization time is excessive and weather problems are suspected, repeat the test in clear weather conditions. Relate weather effects to the necessity to launch with adverse weather in the vicinity.

#### 3.4.1.7. Data Cards

A sample data card is provided as card 44.

CARD NUMBER \_\_\_\_

## OMEGA INITIALIZATION

[START THE STOP WATCH IMMEDIATELY AFTER THE INPUT OF THE INITIAL LATITUDE AND LONGITUDE. RECORD THE TIME WHEN THE INITIALIZATION IS COMPLETE. RECORD QUALITATIVE COMMENTS CONCERNING THE UTILITY OF THE INITIALIZATION STATUS AND INITIALIZATION COMPLETE INDICATIONS.]

INITIAL POSITION \_\_\_\_\_

TIME THE INITIALIZATION IS COMPLETE \_\_\_\_\_

QUALITATIVE COMMENTS: